

TERNOPIL IVAN PULUY NATIONAL TECHNICAL UNIVERSITY

SALAH SHERIF

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**THE PROJECT OF SPORTS COMPLEX WITH GYMS, SPORTS HALL
AND SWIMMING POOL WITH THE STUDY OF HOLDING ELEMENTS OF
STRUCTURE**

192 "Construction and Civil Engineering"

Abstract

diploma work for the degree of master's degree

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The work was performed at the Department of Structural Mechanics of Ivan Puliuy Ternopil National Technical University

Head of work: k.t.s., Ass. prof. **Koval I.V.**, Ternopil Ivan Puluj National Technical University, department of structural mechanics

Reviewer: d.t.s., prof. Pidhursky M.I

Protection will be held 28 December 2019 y. at 10⁰⁰ pm at the meeting №7 examination board in Ternopil Ivan Puluj National Technical University by the address: 46001, Ternopil, str. Ruska, 56, educational building № 2, room 35

Secretary of the Examination Committee No. 7 _____ Pidhursky I.M.

GENERAL CHARACTERISTICS OF THE WORK

The number of buildings with welded steel structures in Ukraine is increasing. These structures include: heavy truss trusses, bridges and truss trusses, supports and runways of process equipment overpasses, conveyor gallery farms, etc. The most common rolling rod joints in these building structures are welded T-, V- K- and TC-like nodes. Together with the benefits of using welded farms in construction, the problem is the complex stress-strain state (SSS) and the high concentration of stresses at the nodes.

Researching the SSS of farm nodes has always been a pressing task. For statically loaded structures that perceive large values of load, early appearance of plastic deformation is possible, which can lead to a loss of load carrying capacity of the farm. It is especially important to know the stress concentration sites for structures that are subject to cyclic loading and are therefore dangerous from the point of view of the fatigue crack origin. The design and manufacture of welded farms does not exclude the influence of subjective factor and therefore the designer can not with high level of probability to assert the actual durability and durability of the construction.

This scientific problem can be solved by determining the actual SSS at the farm units, taking into account their structural and technological features. The classic design calculation of welded farms does not take full account of these features. It is assumed that the new design has no deviations from the project in its manufacture and installation.

The design scheme of the object is considered ideal. At the same time, the current state of the art of computer engineering and numerical methods opens wide opportunities for assessing the rigidity of welded farms in the context of a multifactor computer simulation experiment. Investigation of the influence of structural and technological features of the units on the strength of the welded farm will enable with high degree of probability to determine the functional suitability of the structure, and the obtained results will be of theoretical and practical interest.

MAIN CONTENT OF THE WORK

The introduction The project of sports complex with gyms, sports hall and swimming pool with the study of holding elements of structure.

In the first section «Architectural and construction the main structural elements of the building were considered. The purpose of the designed house, engineering geological and hydrogeological conditions of the construction area, as well as architectural decisions are analyzed. Requirements for fire resistance, fire resistance, lighting, heating and ventilation are also considered. Developed: facades, sections, plans of a typical floor and technical, geological sections.

In the calculation-constructive part were carried out calculations of bearing reinforced concrete structures: monolithic overlappings, prefabricated reinforced concrete staircase march and multi-hollow plate.

In the section on technology and organization of construction production, the definition of the nomenclature and volumes of works, the choice of methods for the execution of works, machines and mechanisms, the determination of the number of vehicles, and the selection of the crane were carried out. A construction master plan and a grid graph

have also been developed and analyzed. Development of a technological map for installation of structures and brickwork.

In the special section a comparative analysis of the combined band and pile foundations was conducted. According to the calculation of the reduced costs of installation of structures, the assembly line is more economical than the pile, so the assembly element is used in the construction.

In the economic part were developed, a record of labor and wages, object estimates for the main building, combined cost estimates of construction costs, which determined the estimated cost in accordance with the procedure for determining the cost of construction and free prices for construction products in the development of market relations .

The main decisions on labor protection and the environment are given.

GENERAL CONCLUSIONS

1. Developed by volume - and architectural designs .
2. The geological analysis of the construction area is performed.
3. The analysis and technical and economical comparison of the types of foundations for multi-storeyed construction on a slope plot are made.
4. The types and volumes of the main construction works are determined. The technological map for the foundation plate arrangement, the calendar schedule of execution of construction and assembly works, the construction plan have been developed.
5. It is established that of all modern types of foundations, the pale- screw has the greatest versatility at an affordable cost. Given the geological conditions of a given type of construction chosen foundation.
6. Researching the SSS of farm nodes, stability of the building to the shock wave and protection of the occupants of the building from the consequences of emergencies.
7. Increasing the economic efficiency of the objects in the production stage and their studies on the economy are indicated.
8. The role of energy saving in solving environmental problems has been established.

MAIN LITERATURE DATA USED IN PERFORMANCE

1. D. Kachlakev. Finite Element Modelling of Reinforced Concrete Structures Strengthening with FRP Laminates / D. Kachlakev, T. Miller, S. Yim, K. Chansawat, T. Potisuk. Special Report SP316, Oregon Department Of Transportation, USA, May 2001. 113 p.
2. G. Murali. Flexural Strengthening Of Reinforced Concrete Beams Using Fibre Reinforced Polymer Laminate: A Review / Murali G., Pannirselvam N. ARPN Journal of Engineering and Applied Sciences Vol. 6, No. 11, November 2011, pp. 41-47.
3. S. F. Brena, R. M. Bramblett, S. L. Wood and M.E. Kreger, Increasing Flexural Capacity of Reinforced Concrete Beams Using Carbon Fiber-Reinforced Polymer Composites, ACI Structural Journal, January-February 2003. 100(6): pp. 827-830. 181
4. Tenic map of the material. Identification No. 02040101 System Sika® CarboDur® Plates. Edition UA_YS_04 / 2011.

5. I. Saifullah. Experimental and Analytical Investigation of Flexural Behavior of Reinforced Concrete Beam / I. Saifullah, M. Nasir-uz-Zaman, S.M.K. Uddin, M.A. Hossain, M.H. Rashid // International Journal of Engineering & Technology. - IJETIJENS, 2011. - Vol 11. - № 1. - p. 146-153.

6. Borysyuk OP Stress-deformed state of normal sections of bending reinforced concrete elements, reinforced by carbon fiber plastics under the action of low-cycle loading / O.П. Borysyuk, OP Kononchuk // Monograph. - Exactly: NSUPP, 2014. - 136 p.

7. Kachlakev D, McCurry DD. Behavior of full-scale reinforced concrete beams retrofitted for shear and flexural with FRP laminates. Compos J 2000;31:445–52.

8. Valivonis J, Skuturna T. Cracking and strength of reinforced concrete structures in flexure strengthened with carbon fibre laminates. Civ Eng Manage J 2006;13(4):317.

9. Yeong-soo S, Chadon L. Flexural behavior of reinforced concrete beams strengthened with carbon fiber-reinforced polymer laminates at different levels of sustaining load. ACI Struct J 2003;100:231–40.

ANNOTATION

Salah Sherif. The project of sports complex with gyms, sports hall and swimming pool with the study of holding elements of structure

. - Diploma work for the degree of master's degree in specialty 192 "Civil Engineering and Civil Engineering". Ternopil Ivan Pulyuy National Technical University named, 2019.

In master thesis project, the project of sports complex with gyms, sports hall and swimming pool with the study of holding elements of structure the main structural elements of the building were considered. The purpose of the designed house, engineering geological and hydrogeological conditions of the construction area, as well as architectural decisions are analyzed. The definition of the nomenclature and volumes of works, the choice of methods for the execution of works, machines and mechanisms, the determination of the number of vehicles, and the selection of the crane were carried out. Comparative analysis of the combined band and pile foundations was conducted. According to the calculation of the reduced costs of installation of structures, the assembly line is more economical than the pile, so the assembly element is used in the construction. A record of labor and wages, object estimates for the main building, combined cost estimates of construction costs, which determined the estimated cost in accordance with the procedure for determining the cost of construction and free prices for construction products in the development of market relations.

Key and the words: holdings elements, hydrogeological conditions, foundations.